

RESPONSE

Claims 1 - 46 are pending. Claims 1-46 were rejected. Claims 1, 7, 9-13, 18, 22-27, 33, 35-38 and 43-46 have been amended. Support for the amendments to claims 1, 7, 24-27, 33 and 45-46 is found in the specification at paragraphs [0012], [0015] and in the claims. The specification was amended to reflect the current patent number and assignee for the patent application (Serial No. 09/119,634) referred to in the specification and to remove the hyperlink referenced in paragraph [0044]. The remaining amendments to the specification and claims are presented for purposes of maintaining substantial correspondence between the claims and the claims and the specification. No new matter is presented by the amended specification or claims.

SECTION 103 REJECTIONS

Claims 1-22, 24-43 and 45-46 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the article “A Practical and Robust Bump-mapping Technique for Today’s GPUs” by Kilgard (“*Kilgard*”) in view of U.S. Patent 4,467,461 issued to Rice (“*Rice*”). Additionally, independent claims 23 and 44 were rejected as being unpatentable over *Kilgard* in view of *Rice* and further in view of U.S. Patent 6,396,495 issued to Parghi et. al. (“*Parghi*”).

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge then-generally available to one of ordinary skill in the art, to modify the reference or to combine referenced teachings. MPEP § 706.02(j). Second, there must be a reasonable expectation of success. *Id.* Finally, the prior art reference (or references when combined) must teach or suggest all of the claim limitations. *Id.*

A. The Proposed Combination of *Kilgard* and *Rice* Does Not Meet the Limitations of Independent Claims 1, 24, 25, 27, 45 and 46.

Independent Claim 1 includes the following limitations:

selecting a first attribute and a second attribute from multiple attributes, *the first attribute and the second attribute each having its own vertices*;

creating a normal map *using at least one of the first and second attributes, the normal map having its own vertices*;

converting the normal map vertices *and the vertices of the at least one of the first and second attributes used to create the normal map* into a matrix representing a tangent space normal map; and

calculating a diffuse lighting component from the tangent space normal map *and the at least one of the first and second attributes used to create the normal map*.

Independent claim 27 is nearly identical except that the normal map is “derived from” at least one of the first and second attributes instead of “using” at least one of the first and second attributes.

The Examiner argues that *Kilgard* (section 5.3) discloses a normal map made up of range-compressed normal vectors representing the perturbation of object surfaces using 2D textures. Final Office Action, p. 2. To be exact, the passage relied upon by the Examiner in *Kilgard* simply states that the normal map is a more conventional 2D texture. Although *Kilgard* (section 5.3) does not describe use of the 2D texture to create the normal map, the Examiner suggests that the 2D texture in *Kilgard* is an attribute presumably representing one of the first and second attributes required to create a normal map in claims 1 and 27. Final Office Action, p. 2. As confirmed by claims 1 and 27, the normal map has its own vertices and the first and second attributes have their own vertices.

The Examiner argues that *Kilgard* (section 5.1) “further discloses transforming the normal map into tangent space represented by the vectors T_n N_n and B_n ... [and] also discloses creating a light vector in tangent space using the above-mentioned matrix along with a calculating light vector in object space.” Final Office Action, pp. 2-3. *Id.* Applicant respectfully traverses the Examiner’s rejection because neither the Examiner nor the passages relied on by the Examiner in *Kilgard* mention the following limitations in claims 1 and 27: i) converting the vertices of the at least one of the first and second attributes used to create the normal map (*i.e.*, the 2D texture in *Kilgard*) into a matrix representing a tangent space normal map and ii) calculating a diffuse lighting component from the at least one of the first and second attributes used to create normal map – *i.e.*, the 2D texture in *Kilgard*.

Applicant respectfully traverses the Examiner’s rejection of independent claims 24, 25, 45 and 46 based on the arguments distinguishing claims 1 and 27 from *Kilgard* and submits that the differences between *Kilgard* and claims 24, 25, 45 and 46 are even more profound.

Claims 24 and 45 parallel the limitations of claims 1 and 27, respectively, except that a single attribute is selected and used throughout the claimed steps. Claims 25 and 46 parallel claims 1 and 27, respectively, except that the first and second attributes are both combined with the ambient lighting component and the diffuse lighting component to form an enhanced image of the first and second attributes. Claims 25 and 46 also include the step of displaying at least a portion of the enhanced image.

The Examiner argues that *Kilgard* (section 5.4) “lastly discloses blending both the ambient illumination component and a diffuse illumination component to form an object’s decal.” Final Office Action, p. 3. Even assuming, *arguendo*, that an attribute is represented by

the texture data in *Kilgard*, the Examiner's reliance on *Kilgard* is misplaced because *Kilgard* fails to meet the additional limitations found in claims 24, 25, 45 and 46.

As described in section 5, *Kilgard* teaches a technique that uses multiple rendering passes. *Kilgard*, p. 16. The technique typically renders in three passes. *Id.* The first pass renders a surface decal. *Id.* The second pass modulates the decal with the bump mapped diffuse and ambient contributions from a single light. *Id.* The third pass adds a bump map specular contribution from a single light. *Id.* Both the second and the third passes are dual textured rendering passes. *Id.* Because the 2D texture and surface decal represent separate textures, the technique's rendering passes can also be scaled back when a decal texture is not required or when the object does not have a specular appearance. *Id.* The cube map and the 2D normal map are the two textures used in the dual textured second and third rendering passes. *Kilgard*, p. 17. Figure 12 illustrates the contribution of each of the three passes. *Kilgard*, p. 18.

Kilgard therefore, does not meet the limitation in claims 24 and 45, which requires "combining an ambient lighting component with the diffuse lighting component and the attribute to form an enhanced image representing at least one property of the object." In other words, the limitation requires combining an ambient lighting component with the diffuse lighting component and the same attribute used to create the normal map. In *Kilgard*, the alleged attribute used to create the normal map is a 2D texture, which is a separate texture (attribute) from the surface decal that is rendered in the first pass and modulated with the ambient and diffuse illumination after blending. *Kilgard*, p. 21. In short, *Kilgard* does not teach or suggest combining an ambient lighting component with a diffuse lighting component and the same attribute (2D texture) used to create the normal map. For the same reason, *Kilgard* does not meet the limitation in claims 25 and 46, which requires "combining an ambient lighting component

with the diffuse lighting component and the first *and* second attributes to form an enhanced image of the first and second attributes.”

B. There is No Suggestion or Motivation to Combine the Techniques Applied to Bump Mapping the Simulated Textures in *Kilgard* With the Real Geophysical Data in *Rice*.

The Examiner attempts to close the gap between *Kilgard* and *Rice* by arguing that both *Kilgard* and *Rice* discuss techniques for displaying simulations of surfaces. Final Office Action, p. 11. The suggestion that *Kilgard* and *Rice* might be combined because they allegedly “discuss techniques for displaying simulations of surfaces” does not render the resultant combination obvious unless the references also suggest the desirability of the combination. MPEP § 2143.01 (citations omitted). Moreover, an alleged “shared advantage” with the claimed invention is insufficient to demonstrate a *prima-facie* case of obviousness.

The Examiner, further, never references where the bump mapping techniques in *Kilgard* are “often associated with the displaying of geographic data (*i.e.* surface data).” While geographic data may be loosely defined as data pertaining to the Earth’s surface, the Examiner fails to reference where the bump mapping techniques in *Kilgard* are applied to such data – much less geophysical data. The passages relied on by the Examiner in *Rice* refer to geophysical data – not geographic data. The differences between the type of data being analyzed are significant. One of ordinary skill in the art would hardly be disposed, on any objective basis, to consider the bump mapping techniques applied to the simulated textures in *Kilgard* when faced with processing real geophysical data to form an enhanced image thereof.

The Examiner responds that “video game technology is constantly gaining on the visual display of realism and therefore, applying “real life” attributes of geophysical data of *Rice* to [the] “video game” techniques of *Kilgard* is and has been, greatly desired in order to provide the greatest sense of realism for a video game user.” Final Office Action, p. 11. The Examiner,

however, fails to provide any technical reasoning to support such a conclusory statement. Moreover, there is no suggestion in *Kilgard* or *Rice* that there was any desire in the video game industry, *at the time the invention was made*, to display geophysical data in order to provide more realism. As a result, the Examiner's statement, as fact, cannot be considered common knowledge or well-known in the art at the time the invention was made. MPEP § 2144.03. Applicant therefore, respectfully requests that the Examiner provide documentary evidence to support the statement or withdraw the statement. *Id* ("If the examiner is relying on personal knowledge to support the finding of what is known in the art, the examiner must provide an affidavit or declaration setting forth the specific factual statements and explanation to support the finding.").

In addition, Applicant submits that the intended function of *Kilgard* and *Rice*, as described in the abstract for each reference, teaches a way from the suggested combination as explained in the Amendment and Response to Office Action Dated March 3, 2006. *In Re: Geisler*, 116 F.3d 1465, 1469 (Fed.Cir. 1997) (discussing a *prima facie* case of obviousness can be rebutted by showing that the prior art teaches away from the claimed invention in any material respect).

Because there is no support to combine *Kilgard* and *Rice* and, in any event, the proposed combination fails to meet the limitations of claims 1, 24, 25, 27, 45 and 46, these claims are patentable over the combination of *Kilgard* and *Rice*.

C. Dependent Claims 2-22, 26 and 28-43 Are Also Patentable Over the Combination of *Kilgard* and *Rice*.

Based on the foregoing arguments, and because claims 2-22, 26 and 28-43 ultimately depend from independent claims 1, 25 or 27, these claims are likewise patentable over the

combination of *Kilgard* and *Rice*. Additionally, claims 2-4, 6, 10, 13, 19, 28-30, 32, 36 and 40 are patentable over the combination of *Kilgard* and *Rice* for the following reasons.

1. Claims 2-4 and 8-30

Applicant reurges the arguments distinguishing claims 2-4 and 28-30 in the Amendment and Response to Office Action dated March 3, 2006, and respectfully requests the Examiner to provide a basis in fact and/or technical reasoning to reasonably support the argument that “these attributes inherently form combinations of one another for each variation of the selection performed by the user.” MPEP § 2112 (explaining that “the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art.”) (citations omitted, emphasis original).

2. Claims 6, 10, 32 and 36

Claims 6, 10, 32 and 36 are patentably distinguished from the combination of *Kilgard* and *Rice* because each of these claims requires the combination of the ambient lighting component and the diffuse lighting component with the same attribute used to create the normal map. As demonstrated hereinabove in reference to claims 24, 25, 45 and 46, neither *Kilgard* nor *Rice* teach or suggest this limitation.

3. Claim 13

Claim 13 is patentably distinguished from the combination of *Kilgard* and *Rice* as neither reference discloses an enhanced image displayed at least partially within a plurality of planer surfaces defining a probe as required by claim 13. The Examiner aptly points out that *Rice* further discloses these representations to comprise of different planer surfaces however, does not describe where *Kilgard* or *Rice* disclose the display of an image partially within a plurality of

planer surfaces defining a probe. As described in the published application [¶ 63] and contrasted with claim 12, the limitation requires the display of an image partially within – not on – a plurality of planer surfaces defining a probe.

4. Claims 19 and 40

Claims 19 and 40 are patentably distinguished from the combination of *Kilgard* and *Rice* because neither reference discloses the application of medical data to the bump mapping techniques described in *Kilgard*. The Examiner's conclusory statement that "it would have obvious to one of ordinary skill in the art to modify the techniques of *Kilgard* to operate upon medical data instead of...geophysical data" is simply not supported by the references themselves or knowledge of one having ordinary skill in the art. Final Office Action, p. 8. For example, the Examiner's suggestion that one of ordinary skill in the art "would have expected Applicant's invention to perform equally well with the geophysical data of *Rice* "does not support why one of ordinary skill in the art would "modify the techniques of *Kilgard* to operate on medical data instead of the geophysical data of *Rice*." *Id.* More importantly, however, the Examiner's reliance on Applicant's specification to support the proposed modification of *Kilgard* is misplaced. MPEP § 2142 ("The teaching or suggestion... and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure.") (citations omitted).

D. Dependent Claims 23 and 44 Are Also Patentable Over the Combination of *Kilgard* and *Rice*.

Claims 23 and 44 were rejected under 35 U.S.C. § 103(a) as being unpatentable over *Kilgard* in view of *Rice* and further in view of *Parghi*. Because claims 23 and 44 ultimately depend from independent claims 1 and 27, respectively, these claims are also patentably distinguished from the combination of *Kilgard*, *Rice* and/or *Parghi*.

CONCLUSION

Based on the remarks and analysis herein, claims 1-46 are patentable over the combination of *Kilgard*, *Rice* and/or *Parghi*. Applicant therefore, respectfully requests reconsideration and allowance of all claims or, in the alternative, a telephonic interview to discuss the merits of the prior art relied upon by the Examiner.

The Commission is hereby authorized to charge the 3-month extension fee, any other amount required, or credit any overpayment, to account number 50-3385. A duplicate copy of this sheet is enclosed.

Respectfully submitted,

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